

WHAT IS CLAIMED IS:

1. A method of patterning magnetic material comprising:

(a) preparing a ferromagnetic material layer containing at least one element selected from the group consisting of Fe, Co and Ni;

5 (b) masking a surface of the ferromagnetic material layer selectively; and

(c) making nonferromagnetic comprising:

exposing an exposed portion of the surface of the ferromagnetic material layer in halogen-containing active reaction gas or reaction liquid,

10 converting the exposed portion and a lower layer thereof into a compound with a component in the reaction gas or the reaction liquid by chemical reaction; and

making the compound nonferromagnetic.

2. The method of claim 1, wherein the halogen is fluorine.

3. The method of claim 1, wherein the compound is a cobalt fluoride.

15 4. The method of claim 1, wherein the halogen-containing active reaction gas is generated by a plasma generating apparatus.

5. The method of claim 1, wherein the masking and the making nonferromagnetic steps write servo information for controlling at least one of a position and a speed on the ferromagnetic material layer, the position and the speed are relative to a magnetic head,.

20 6. The method of claim 1, wherein the masking step comprises:

forming a block copolymer layer composed of a plurality of island regions and a separation region that separate the island regions from each other, on the surface of the ferromagnetic material layer by a self-organization phenomenon; and

removing the island regions selectively.

25 7. The method of claim 6, wherein the making nonferromagnetic step forms magnetic recording regions corresponding to the island regions and a nonferromagnetic region corresponding to the separation region, and the separation region is removed

after the making nonferromagnetic step.

8. The method of claim 7, wherein servo information for controlling at least one of a position and a speed is written in each of the magnetic recording regions, the position and the speed are relative to a magnetic head.

5 9. A magnetic storage medium comprising:

a plurality of recording regions made of ferromagnetic materials, each containing at least one element selected from the group consisting of Fe, Co and Ni; and

10 a nonferromagnetic material region for separating the recording regions from each other, the region being a compound region of the ferromagnetic material and halogen.

10. The magnetic storage medium of claim 9, wherein the halogen is fluorine.

11. The magnetic storage medium of claim 10, wherein the compound is a cobalt fluoride.

12. A magnetic storage medium comprising:

15 a servo layer comprising: a plurality of recording regions made of ferromagnetic materials, each containing at least one element selected from the group consisting of Fe, Co and Ni; and a nonferromagnetic material region for separating the recording regions from each other.

13. The magnetic storage medium of claim 12, further comprising:

20 a nonmagnetic material layer formed on the servo layer; and

a recording layer formed on the nonmagnetic material layer.

14. The magnetic storage medium of claim 12, wherein the halogen is fluorine.

15. The magnetic storage medium of claim 14, wherein the compound is a cobalt fluoride

25 16. A magnetic random access memory comprising:

a lower electrode layer formed on a surface of a substrate;

a first ferromagnetic material layer made of a first ferromagnetic material

containing at least one element selected from the group consisting of Fe, Co and Ni, the first ferromagnetic material layer being formed on the lower electrode layer;

a tunnel insulating layer formed on the first ferromagnetic material layer;

5 a second ferromagnetic material layer made of a second ferromagnetic material containing at least one element selected from the group consisting of Fe, Co and Ni, the second ferromagnetic material layer being formed on the tunnel insulating layer; and

an insulating layer surrounding the first ferromagnetic material layer, the tunnel insulating layer, and the second ferromagnetic material layer, the insulating layer containing a compound layer of the first ferromagnetic material and halogen, and a
10 compound layer of the second ferromagnetic material layer and the halogen.

17. The magnetic random access memory of claim 16, wherein the halogen is fluorine.

18. The magnetic random access memory of claim 16, wherein the compound is a cobalt fluoride.